Trend Study 21B-15-03

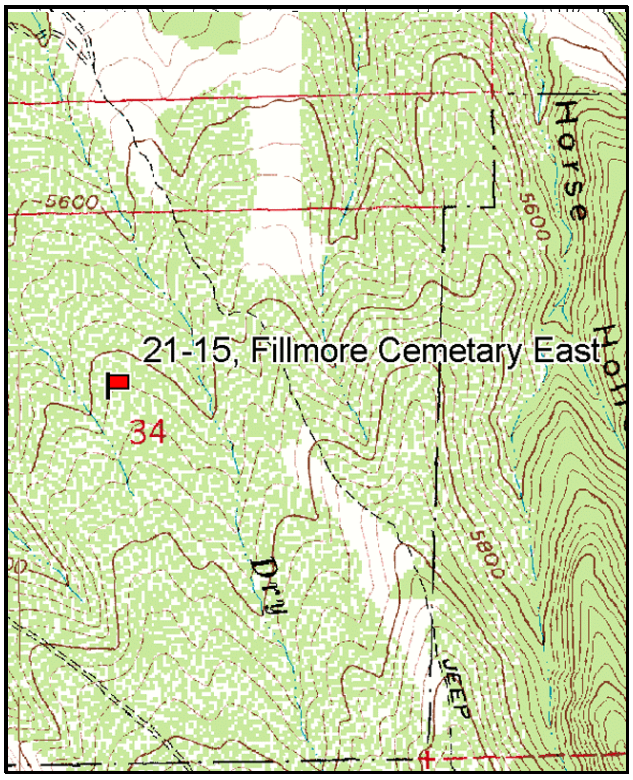
Study site name: Fillmore Cemetery East . Vegetation type: Oak-Sagebrush .

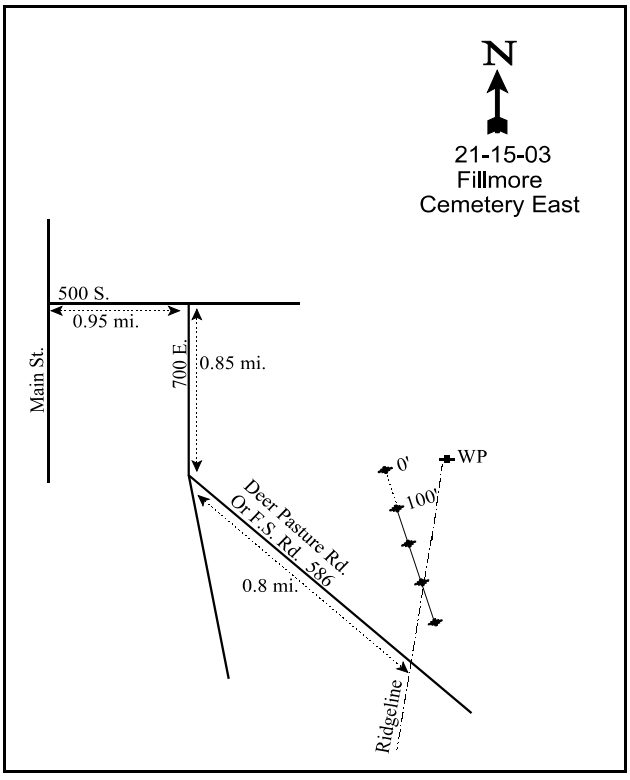
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 500 South and Main in Fillmore (the bend in the road), go east for 0.95 miles past the LDS Church and the cemetery to an intersection. Turn right (south) and go 0.85 miles to F.S. Road #386. Turn left and follow this road 0.8 miles to the ridgeline. From the ridgeline, walk north about 1/3 of a mile to a witness post (full high rebar). The frequency baseline starts 100 feet west (254°M) of the cairn. The 0' foot stake is a rebar tagged #7073.





Map Name: Fillmore

Diagrammatic Sketch

Township 21S , Range 4W , Section 34

GPS: NAD 27, UTM 12S 4311088 N, 388279 E

DISCUSSION

Fillmore Cemetery East - Trend Study No. 21-15

This study is located in the center of a Division owned section southeast of Fillmore. The site slopes to the northwest at 8% and has an elevation of 5,700 feet. The current community type is mountain big sagebrush-oak with scattered juniper. The site was chained and seeded in 1973. Cattle grazed the allotment in the late 1970's, but it has been rested since 1981. Pellet group data from the DWR South Chalk transect estimated an average of 49 deer days use/acre (121 ddu/ha) between 1981 and 1985 (Jense et al. 1985). Deer use averaged 42 days use/acre (104 ddu/ha) between 1985 and 1990 (Jense et al. 1991). A pellet group transect read on site estimated 80 deer use days/acre (198 ddu/ha) in 1998 and 62 deer days use/acre (152 ddu/ha) in 2003. Elk use is minimal on this site at only 1 day use/acre (3 edu/ha) in 2003. Most of the pellet groups that were sampled in 1998 appeared to be from the fall or early winter of 1997 and were mostly centered around bitterbrush and sagebrush plants.

Soils on the site have fair depth, but are very rocky on the surface and throughout the profile. Effective rooting depth was estimated at almost 11 inches. Parent material is conglomerate, quartzite, and sandstone. Soils are slightly acidic (pH of 6.5) and sandy clay loam in texture. Under the shrubs, litter is deep and the organic content of the surface layer is relatively high. In the shrub interspaces there is a considerable amount of bare ground where rock/pavement cover is concentrated on the surface. However, erosion is not a serious problem on this site and any soil movement appears localized. An erosion condition class assessment rated soils as stable in 2003.

Overall, browse composition is dominated by mountain big sagebrush and Gambel oak. Oak occurs in scattered clones and in some places it is more abundant than sagebrush. All of the big sagebrush was classified as mountain big sagebrush although a portion of the population appears to be a hybrid with basin big sagebrush. Mountain big sagebrush provided about 60% of the browse cover in 1998 and 2003. Density has been fairly stable averaging about 2,500 plants/acre since 1985. There have been few young in all surveys, and percent decadence has been relatively high, ranging from 33% (1998) to 68% (1991). In 2003, nearly one-half of the decadent plants were classified as dying. With no young sampled in 2003, this may result in a population decline in the future. Use on big sagebrush has been light to moderate. Vigor was mostly normal in 1985 and 1998, but reduced on a portion of the population in 1991 and 2003. Annual sagebrush leaders averaged 1.8 inches of growth in June 2003.

Gambel oak occurs in dense clumps with many young sprouts. It appears to be increasing, with little sign of use, the trees are producing good quantities of browse that deer can utilize. The much larger sample used post-1992 sampled less oak compared to the earlier readings resulting in a lower density estimate. However, the larger sample better estimates shrub populations which often have clumped distributions such as oak on this site. Oak was estimated at 1,500 and 2,280 stems/acre in 1998 and 2003 respectively. Decadence is low, vigor normal, and use light on oak in all readings. Oak is rarely utilized on this site and is not as important to monitor as sagebrush and bitterbrush. Broom snakeweed was fairly common in 1998, but density declined by 81% in 2003.

Antelope bitterbrush occurs in low densities on the site and is found in the more open sagebrush areas. Bitterbrush density averaged 350 plants/acre in 1998 and 2003. This is a low-growing form due to moderate to heavy use. The population of bitterbrush has normal vigor and no decadence was noted in the population.

Perennial forbs and grasses are uncommon, especially where the oak is dense. Most of the herbaceous perennial species are found growing in close proximity to or underneath the protection of shrubs. The most common desirable grasses include bottlebrush squirreltail, crested wheatgrass, and Sandberg bluegrass. Bulbous bluegrass, a low value perennial, is increasing on the site. Cheatgrass and Japanese brome are

abundant and provided 60% of the grass cover in 1998 and 2003. Sum of nested frequency for annual grasses was nearly double that of perennial grasses in 2003. The abundance of annual grasses poses a serious fire hazard on this site as the key browse, mountain big sagebrush, is intolerant of fire. The dominance of annuals and the associated competition for resources creates an unfavorable environment for shrubs to reproduce in. Forbs are diverse, but have been dominated by annuals and thistle. The forb component was less abundant in 2003 compared to 1998 when pale alyssum was sampled at its highest frequency.

1985 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving as erosion is slight and litter and soil conditions appear to be improving. Oak will continue to increase but the sagebrush is well established and it will take a long time to displace it. Therefore, the mixture of sagebrush and oak should supply forage and cover requirements for many years. A continued rest from grazing will benefit the scarce herbaceous vegetation.

1991 TREND ASSESSMENT

Soil trend is stable with most of the basic cover values remaining similar to 1985 conditions. Percent bare ground did increase slightly. Bare ground (relatively high) and vegetative basal cover (fairly low) should be watched closely for any significant changes. Key browse species sampled on the density plots were mountain big sagebrush and Gambel oak. Mountain big sagebrush demonstrated slight increases in density, but decadence increased to 68%, with 32% of the plants being classified as having poor vigor. The high percent decadence is a result of the drought we have been experiencing. Gambel oak exhibited a slight decrease in density, while broom snakeweed substantially increased. The overall trend for key browse is considered slightly down. Here again, we have the typically depleted understory of grasses and forbs for herd unit 21. There has been a slight increase (sum of nested frequency) for both grasses and forbs, but because the values are so low, trend is considered stable for now.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

1998 TREND ASSESSMENT

Trend for soil is stable. Declines in bare ground and litter cover balance each other out, as vegetation cover is relatively high. Erosion is not currently a problem on this site. Trend for browse is stable for the key species, mountain big sagebrush and bitterbrush. Density of Gambel oak declined in density due to the larger sample used in 1998. It is mostly not utilized and less important as forage. Sagebrush displays light to moderate use, improving vigor, and a decline in percent decadence from 68% to 33%. Young plants sampled in 1998 appear to be in sufficient numbers to maintain the current population. Bitterbrush was picked up in the larger sample used in 1998. Population density is currently estimated at 360 plants/acre. Utilization is moderate to heavy, but vigor is good and there were no decadent plants sampled. The herbaceous understory is depleted especially for forbs. Three species of perennial grasses are present in moderate numbers, but annual grasses consisting of Japanese brome and cheatgrass currently account for 60% of the grass cover. One of the perennial grasses is bulbous bluegrass, a less desirable species. It was first sampled in 1991 and has increased significantly in nested frequency. Forbs are diverse but dominated by annuals and thistle. Trend is considered stable.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable. Ground cover parameters are stable with very little sign of erosion in 2003. Trend for browse is stable. Mountain big sagebrush has a stable density with no young sampled in 2003. Decadence and poor vigor both slightly increased in 2003 but not enough to warrant a downward trend. The main negative factor with mountain big sagebrush is that 46% of the decadent plants were classified as dying in 2003. With no young in the population, big sagebrush density could decline in the future. The abundance of annual grasses in the understory has created an unfavorable environment for shrub species to reproduce in. Bitterbrush occurs in lower densities but has a stable, vigorous, healthy population. Gambel oak is slowly increasing, has low decadence, and good vigor. Although less preferred than big sagebrush and bitterbrush, oak in low densities provides some forage for wintering deer. Trend for the herbaceous understory is stable. Annual species, primarily cheatgrass and Japanese brome, dominate the understory, but perennial species have maintained stable frequencies since 1998. Bulbous bluegrass, a low value perennial, is slightly increasing on the site. Crested wheatgrass, bottlebrush squirreltail, and Sandberg bluegrass all have stable nested frequency values in 2003.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 21 , Study no: 15

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron cristatum	22	11	28	23	1.03	.96
G	Agropyron spicatum	-	3	4	10	.03	.91
G	Bromus japonicus (a)	-	-	$_{b}$155	$_{a}$133	2.98	1.03
G	Bromus tectorum (a)	-	-	$_{a}$266	$_{b}$292	3.80	9.64
G	Festuca myuros (a)	-	-	-	8	-	.02
G	Poa bulbosa	$_{a}$-	$_{ab}$8	$_{b}$26	$_{c}$66	1.16	2.07
G	Poa fendleriana	-	-	3	-	.03	-
G	Poa secunda	$_{a}$16	$_{a}$26	$_{b}$55	$_{b}$52	.87	.89
G	Sitanion hystrix	$_{a}$22	$_{a}$45	$_{ab}$50	$_{b}$77	1.35	2.04
G	Vulpia octoflora (a)	-	-	7	-	.01	-
Total for Annual Grasses		0	0	428	433	6.80	10.70
Total for Perennial Grasses		60	93	166	228	4.48	6.88
Total for Grasses		60	93	594	661	11.29	17.59

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Alyssum alyssoides (a)	-	-	$_{b}$157	$_{a}$86	1.03	.45
F	Arabis spp.	-	-	3	-	.03	-
F	Astragalus argophyllus	2	3	3	-	.03	-
F	Astragalus cibarius	1	1	3	-	.04	-
F	Asclepias spp.	-	-	7	-	.18	-
F	Calochortus nuttallii	$_{a}$-	$_{b}$8	$_{a}$-	$_{a}$-	-	-
F	Chaenactis douglasii	-	4	-	-	-	-
F	Cirsium calcareum	$_{a}$17	$_{b}$34	$_{a}$15	$_{a}$5	.70	.21
F	Collinsia parviflora (a)	-	-	8	5	.02	.01
F	Crepis acuminata	-	-	1	-	.00	-
F	Cryptantha spp.	-	3	-	-	-	-
F	Descurainia pinnata (a)	-	-	13	1	.02	.00
F	Draba spp. (a)	-	-	$_{b}$43	$_{a}$-	.42	-
F	Epilobium brachycarpum (a)	-	-	3	-	.00	-
F	Eriogonum racemosum	-	5	-	-	-	-
F	Galium boreale	-	-	4	6	.01	.30
F	Holosteum umbellatum (a)	-	-	$_{b}$27	$_{a}$3	.06	.00
F	Lactuca serriola	$_{a}$-	$_{b}$9	$_{a}$-	$_{a}$-	-	-
F	Linum lewisii	14	2	6	6	.04	.01
F	Lithospermum ruderale	6	7	-	5	.00	.16
F	Machaeranthera canescens	1	3	3	-	.00	-
F	Microsteris gracilis (a)	-	-	6	-	.04	-
F	Phlox longifolia	3	5	2	1	.01	.00
F	Ranunculus testiculatus (a)	-	-	$_{b}$49	$_{a}$9	.13	.01
F	Sphaeralcea coccinea	-	-	2	-	.00	-
F	Streptanthus cordatus	-	-	1	3	.00	.00
F	Zigadenus paniculatus	$_{a}$6	$_{b}$17	$_{ab}$6	$_{ab}$10	.07	.13
Total for Annual Forbs		0	0	306	104	1.74	0.49
Total for Perennial Forbs		50	101	56	36	1.14	0.82
Total for Forbs		50	101	362	140	2.89	1.31

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 21 , Study no: 15

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia tridentata vaseyana	80	68	16.78	17.32
B	Gutierrezia sarothrae	41	18	2.22	.54
B	Juniperus osteosperma	0	0	-	1.16
B	Opuntia spp.	2	2	.15	-
B	Purshia tridentata	12	12	6.00	5.68
B	Quercus gambelii	16	19	2.68	3.82
Total for Browse		151	119	27.84	28.55

CANOPY COVER, LINE INTERCEPT --
Management unit 21 , Study no: 15

Species	Percent Cover
	'03
Artemisia tridentata vaseyana	13.69
Gutierrezia sarothrae	.50
Juniperus osteosperma	2.68
Purshia tridentata	6.56
Quercus gambelii	6.88

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 21 , Study no: 15

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.8
Purshia tridentata	2.3

POINT-QUARTER TREE DATA --
Management unit 21 , Study no: 15

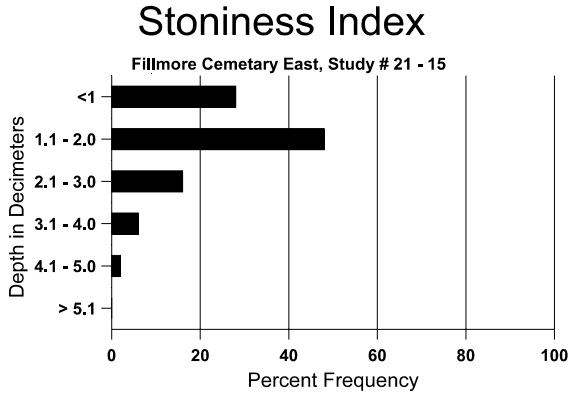
Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus osteosperma	7	N/A	8.7	N/A

BASIC COVER --
Management unit 21 , Study no: 15

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	1.75	2.75	39.64	44.63
Rock	4.75	6.75	6.26	5.70
Pavement	17.25	12.50	16.35	9.59
Litter	57.25	57.00	54.25	43.54
Cryptogams	0	0	1.10	.57
Bare Ground	19.00	21.00	15.75	16.76

SOIL ANALYSIS DATA --
Management unit 21, Study no: 15, Study Name: Fillmore Cemetary East

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
10.7	66.0 (13.0)	6.5	46.0	27.4	26.6	2.8	23.4	169.6	0.8



PELLET GROUP DATA --
Management unit 21 , Study no: 15

Type	Quadrat Frequency	
	'98	'03
Rabbit	15	6
Horse	1	-
Elk	-	-
Deer	51	35
Cattle	-	-

Days use per acre (ha)	
'98	'03
-	-
-	-
-	1 (3)
80 (198)	62 (152)
1 (2)	-

BROWSE CHARACTERISTICS --
Management unit 21 , Study no: 15

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana											
85	**2466**	66	-	1466	1000	-	38	0	41	5	26/29
91	**2533**	266	-	800	1733	-	13	0	68	32	31/35
98	**2680**	80	180	1620	880	520	15	0	33	7	28/38
03	**2440**	-	-	1440	1000	640	16	7	41	19	26/34
Gutierrezia sarothrae											
85	**1399**	266	933	466	-	-	5	0	0	14	7/6
91	**2866**	466	400	2333	133	-	0	0	5	0	9/11
98	**5100**	60	640	4460	-	-	0	0	0	0	7/9
03	**980**	-	60	880	40	80	0	0	4	2	7/9
Juniperus osteosperma											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	20	-	-	-	-	0	0	-	0	-/-
Opuntia spp.											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**40**	-	-	40	-	-	0	0	-	0	7/16
03	**40**	-	-	40	-	-	0	0	-	0	6/19
Purshia tridentata											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**360**	-	60	300	-	-	67	17	-	0	21/46
03	**340**	-	-	340	-	-	0	100	-	0	25/87
Quercus gambelii											
85	**9065**	8066	7333	1666	66	-	2	0	1	7	66/45
91	**8932**	2266	5666	2200	1066	-	7	0	12	7	72/38
98	**1500**	180	700	800	-	300	0	0	0	0	50/35
03	**2280**	60	780	1240	260	360	10	.87	11	5	34/27